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*On the OSTEOLOGY and AFFINITIES of the NATIVES of the ANDAMAN ISLANDS.* By WILLIAM HENRY FLOWER, LL.D., F.R.S., P.Z.S., V.P. Anthropol. Inst.,† &c.

THERE are few people whose physical characters offer a more interesting subject for investigation to the anthropologist than the native inhabitants of the Andaman Islands.

Purity of type, due to freedom from mixture with all other races for an extremely long period owing to their isolated position and their inveterate hostility to all intruders on their shores, and exemplified in their uniformity of physical characteristics, is to be found among them, perhaps in a more complete degree than in any other group of mankind. The type, moreover is an extremely peculiar one, presenting a combination of characters not found in any race of which we have at present materials for a satisfactory comparison. It is indeed probable that the more or less mixed and now scattered fragments of Negrito populations found in the interior of various islands of the Indo-Malayan Archipelago, and even upon some parts of the mainland of Asia, may have been derived from the same stock, but the special interest of the Andamanese consists in the fact that they alone of these diminutive black, woolly-haired people occupy the whole of the small islands on which their ancestors have dwelt from time immemorial, or rather did so occupy them until the coming upon them of the English in 1857.

That a certain admixture from other races occasioned by intentional visits, or accidental wrecking of vessels on their coasts, and absorption of some portion of foreign element thus derived into the native population may have taken place from time to time, cannot be denied, but it is questionable whether this has been sufficient to affect materially the physical characters of the majority. Although most recent and carefully made observations, especially when supported by osteological and

\* *Vide* pp. 35-50 in the present volume.

† Read June 24th, 1879.

photographic evidence, tends to confirm the view that a striking uniformity of type is prevalent among the Andamanese, we cannot ignore the statements of many travellers, and even residents in the islands to the contrary effect, among which I may cite those of St. John,\* F. Day,† and General H. Man.‡

I have no means at my disposal for solving this difficulty, but would earnestly recommend it to the attention of residents in the islands, the more especially as no time must be lost in prosecuting such inquiries. The presence of as many as 7000 Indian convicts, with the necessary attendant foreign population, must in a very short time work a complete moral and physical change among the natives of the islands, if it does not, as is most probable, lead to their utter extinction.

The fact should not be forgotten that the material evidence upon which the view of the uniformity of the Andamanese is based has been derived mainly from natives of the vicinity of the English Settlement at Port Blair, and that it is possible that when more extended collections and observations are made, the statements just referred to may receive corroboration or explanation.

A large number of works, memoirs, and notices have been devoted to the Andaman Islanders, chiefly relating, however, to their general history and social customs. Reference to most of these will be found in the excellent and, for the date at which it was written, exhaustive memoir entitled "*Etude sur les Mincopies*,"§ by M. de Quatrefages, published in the "*Revue d'Anthropologie*," tome i, 1872. Of those published since, none have given any information regarding the osteological characters, which are the special subjects of the present communication. I may, however, refer to two very interesting papers which have seen the light through the medium of our Institute, and which will be found in the pages of our Journal, viz. : "On the Andamans and Andamanese," by G. E. Dobson, "*Journal Anthropological Institute*," vol. iv, p. 457, and "On Mr. Man's Collection of Andamanese and Nicobarese Objects," by Major-General A. Lane Fox, "*Journal Anthropological Institute*," vol. vii., p. 434.

Our present knowledge of the osteology of the Andamanese is derived from the somewhat brief description of a skeleton by Professor Owen||, from an account of another skeleton and

\* "*Trans. Ethnol. Soc.*," vol. v, p. 45.

† "*Proc. Asiatic Soc. of Bengal*," 1870, p. 155.

‡ Supplement to Dr. Barnard Davis's "*Thesaurus Craniorum*," p. 69.

§ "*Mincopie*," a name first applied to the Andamanese by Lieut. Colebrooke, is often used in European literature, but does not seem to be known to the islanders themselves.

|| "*Brit. Assoc. Reports*," 1861, also (without figure), "*Trans. Ethnol. Soc.*," vol. ii (*n.s.*), 1867, p. 34.



Fig. 1



Fig. 2

J Smt hth

Hanhart scap

ANDAMANESE CRANIA.



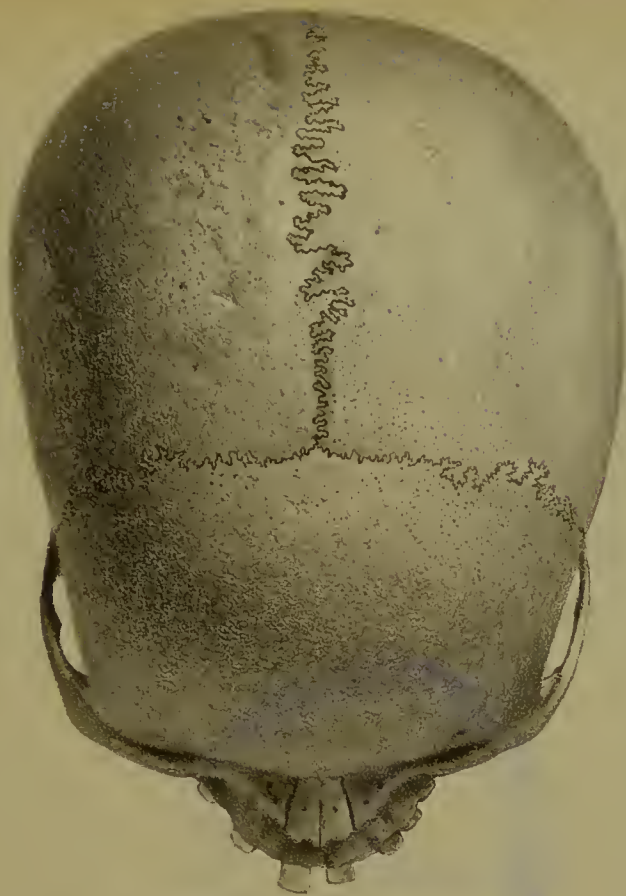


Fig 1.

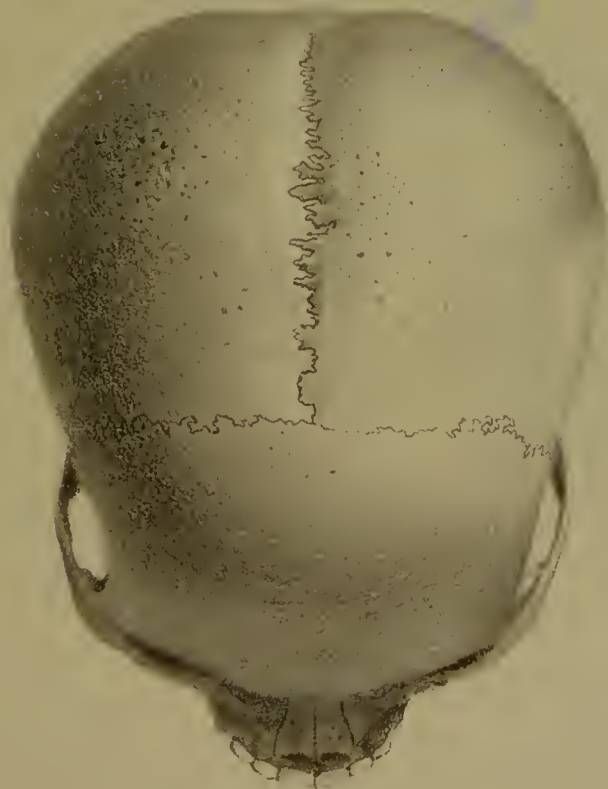


Fig 2.

J Smit lith.

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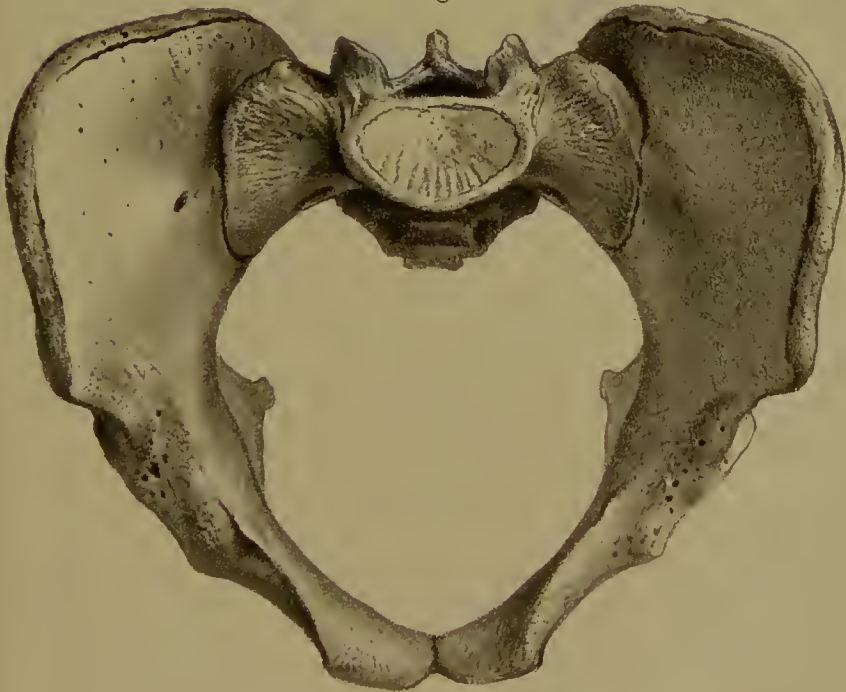
ANDAMANESE CRANIA.



Fig 1.



Fig 2.







notices of several crania by Dr. Barnard Davis,\* a description of two crania by Mr. Busk,† and of two by M. de Quatrefages.‡

The materials upon which the observations which follow are based, are far more abundant than any which have hitherto been brought together, and are, I trust, sufficient to draw with safety some general conclusions as to the physical characteristics of the race. Perhaps when still larger numbers of skeletons are examined, some of the statements and average measurements and indices will have to be modified, but probably not in any essential degree.

These materials consist of nineteen more or less complete skeletons of adults, of which nine belong to the male, and ten to the female sex. Thirteen of these are in the collection of the Royal College of Surgeons, ten having been presented by Surgeon-Major Joseph Dougall, M.D., whose recent death from typhoid fever, while in discharge of his duty as Senior Medical Officer at the Andaman Islands, science has much reason to deplore. One was received in exchange from the India Museum at Calcutta through the courtesy of Dr. J. Anderson, and two were presented by General Man, at the request of my friend Mr. J. R. Mummery. Of the other six skeletons, two are in the British Museum, one being that which was brought to this country in 1861 by Dr. J. Mouatt, and described by Professor Owen; the other was presented in 1865 by Dr. J. Ingle. Two others in the collection of the University of Oxford have been most liberally placed at my disposal by Professor Rolleston, and for two more I am indebted to the kindness of Dr. Allen Thomson.

The crania that have been personally examined have amounted to nearly thirty, but of some, circumstances have only allowed of a few notes being taken; others are too young to be included in the averages; but of twenty-four I have been able to obtain complete measurements. These include fourteen belonging to the Museum of the Royal College of Surgeons, two belonging to the Middlesex Hospital Museum (formerly described by Mr. Busk), three in the British Museum, two in the Oxford Museum, two belonging to Dr. Allen Thomson, one lent by Mr. Valentine Ball, and one in the Museum of University College, London, for the loan of which I am indebted to Professor Ray Lankester.

### *Stature.*

Although, with one exception, the skeletons are not articulated, they afford some evidence as to the size and amount of variation

\* Supplement to "Thesaurus Craniorum," 1875.

† "Trans. Ethnol. Soc.," vol. iv (1866), p. 205.

‡ "Etude sur les Mincopies." "Revue d'Anthrop.," tome i, 1872.

in height of the two sexes of the Andamanese. These people have always been regarded as among the smallest of human races. St. John gives their average height as 5 feet. Dr. Charles Smith, from 4 feet 10 inches to 5 feet for the males, and under 4 feet 10 inches for the females. Dobson saw none over 5 feet 4 inches, and was especially struck by the remarkable contrast between the size of the males and females. With our own race is it usual to estimate the height as bearing the proportion to the length of the femur, as 1000 to 275. This of course is only an average, subject to very considerable individual variations. Wishing to ascertain whether the same rule might be applied to the Andamanese, I first calculated on this basis the probable height of the skeleton (a female), which is mounted in the Museum of the College of Surgeons. Taking the mean length of the two femurs at 368·5 millimetres (the right being 367 and the left 370); the height, on this calculation, ought to be 1340, which is only 20 millimetres more than the skeleton actually measures (*i.e.* 1320 = exactly 52 inches), or as nearly as possible what the real height of the person would be when living. Such being the case, it may be assumed that we shall not be greatly in error in applying the same rule to the other skeletons. Taking the males first, the average length of the femurs is 398·7 millimetres, the maximum 442, the minimum 378, which gives for the stature an average of 1448, or exactly 4 feet 9 inches, a maximum of 1600 or 5 feet 3 inches, and a minimum of 1385 or 4 feet 6·5 inches. The tallest man is the one first brought to this country by Dr. Mouatt, and it should be remarked that he very considerably exceeds any of the others; the next largest femur being only 410 millimetres.

The average length of the femur of the females is 378·2 millimetres, the maximum 410, the minimum 358, which would give an average height of 1375 or 4 feet 6·1 inches, a maximum of 1481 or 4 feet 10·3 inches, and a minimum of 1302 or 4 feet 3·2 inches. Only one female, that belonging to the Oxford Museum, exceeds the average of the men, and only one of the men is as low as the average of the women.

I do not think that these measurements are sufficiently numerous, or the calculations on which the results are based sufficiently reliable, to give a true average of the height of the sexes, but they probably give fair approximations and are interesting as corroborating the view generally entertained of the diminutive proportions of the race.

Though small, there is nothing about the bones which indicates degeneration or debility. They are well-proportioned, fairly stout for their length, and the processes and surfaces for

the attachments of muscles well marked, in some cases very strongly so.

### *Cranium.*

When a large series of crania of Andamanese are placed together, their wonderful similarity cannot fail to strike the observer. In no other race with which I am acquainted could be found in such a series—which, it must be remembered, was not selected for any particular object, but consists of all available specimens, collected from various sources—so little diversity either in size or general conformation.

Not, however, but what they do all present individual differences, which appear more marked the more attentively they are studied. After having had twenty-four skulls in my room for a few days, repeatedly examining, handling and measuring them, the special characters of each became so distinctly revealed, that I could in a moment recognise each one from the other; as no doubt would be the case with the living individuals of the race, whose general similarity at first sight has struck so many travellers.

The next, and a very remarkable point connected with them is, that they present a peculiar combination of characters, which distinguish them from the crania of all other people, at least all which I have had an opportunity of examining. It may seem rather a strong assertion to make, and perhaps further experience may cause me to modify it, but my present impression is that I could never fail to recognise the skull of a genuine Andamanese as being such, and that I have never seen a skull from any other part of the world that I should assign to a native of these islands. It is possible, indeed most probable, that other Negritos may have skulls exactly resembling those of the Andamanese, but none of them have as yet come under my observation. The skull of a Negrito or Até, from Panay in the Philippines, figured by Dr. Barnard Davis (*"Thesaurus"* p. 301, fig 84), appears very like one, though I cannot say that this is the case with that from Luçon, in Quatrefages and Hamy's *"Crania Ethnica,"* Plates XIII, XIV, and XV.

Crania which have not arrived at full maturity have been excluded from the series of twenty-four from which the measurements are taken, though they have been used for certain other observations, in which complete development is not an essential. I have, however, although with some misgivings, as contrary to the practice usually followed, included one, in which the basilar suture is not firmly closed—the female skull belonging to the Middlesex Hospital—which appears in all other respects

to have so nearly attained its full development that it seemed scarcely necessary to diminish the number of averages by rejecting it, especially as it is one of those previously described by Mr. Busk.

Of the twenty-four skulls, I assign twelve to males and twelve to females. In most cases there is evidence from other sources, either the presence of the entire skeleton, or the history of the individuals, to attest the sex. In the few cases in which there was no such evidence there has been little difficulty in assigning them to one or the other category. The possession of so many specimens in which the sex is absolutely known, makes it far easier than it otherwise would be to determine the differential sexual characters of the race, especially as these are by no means great.

In regard to size, the general averages give the preponderance, as might be expected, to the males, though there are individual cases in which females are larger than those of the opposite sex. The female heads are nearly all proportionately broader in the parietal region, and in fact they present what may be considered the most typical form of the race in a more marked manner than those of the males. There is but little difference in the bones of the face, supraorbital ridges and glabella, but the mastoid processes are invariably more developed in the males than in the females; and this constitutes the surest character by which to distinguish the sexes. The other differences will appear in the course of the description.

It should be mentioned that none of the skulls present any signs of artificial or of pathological deformation, unless the rather considerable length of the male, belonging to the Middlesex Hospital, be, as conjectured by Mr. Busk, occasioned by early synostosis of the parietal suture.

In general size the skulls may be considered as belonging to the smallest, or nearly the smallest, of any race. The cranial capacity of the males\* ranges between 1150 and 1360 cubic centimetres; the general average being 1244; that of the females between 1025 and 1250; the average being 1128.† This difference between the average of the two sexes is expressed by the proportion of 1000 to 907.

This is probably very much the same relative proportion as that which exists between the cranial cavity of the two sexes of the English people; at all events it very closely accords with what is known of their brain weight from the extensive series of observations of Sims, Clendenning, and Reid, quoted by Dr. A.

\* Eleven only could be measured. That presented by Dr. Mouatt to the British Museum being in a too mutilated condition.

† Average of twelve.

Thomson in "Quain's Anatomy," those of Dr. R. Boyd,\* and those of Dr. Crochley Clapham,† which give respectively the ratios of 89, 90, and 91 to 100; so that 90 may safely be taken as a general average. In the Australians, in the Museum of the College of Surgeons, the proportion is as 89 to 100; in a considerable series of skulls of Italian peasants 87 to 100, in modern Parisians, according to Dr. Gustave Le Bon,‡ the capacity of the female skull differs from that of the male by as much as 857 to 1000.

The average horizontal circumference in the males is 480 millimetres, in the females 462, and the average vertical transverse circumference in the males 410, and in the females 395. For the individual numbers, I must refer to the tables of measurement.

The latitudinal index or relation of the greatest transverse (parietal) breadth to the length (ophrयो-occipital) averages, taking both sexes together, 816; they are therefore, as a race, truly brachycephalic. As usual there are individual differences, the lowest index being 767; this is the skull with the closed sagittal suture, belonging to the Middlesex Hospital, described by Mr. Busk. As already mentioned, it has been suggested that this presents an aberrant form, but if so, it is only to a very slight degree, as two other erania, which have the sagittal suture open, and otherwise are perfectly normal, have indices almost as low, viz.: 775 and 778 (see Table I). The highest index is 868. Generally speaking, the males have narrower heads than the females, the average index of the former being 805, that of the latter 827; and of the seven skulls of the twenty-four, the index of which falls below 800, six belong to the male sex.

The average altitudinal index (ratio of the basi-bregmatic height to ophryo-occipital length) in both sexes is 775, being 770 in the males and 779 in the females. In only one (Mr. Ball's) out of the twenty-four skulls does the height exceed the breadth, and this only by 2 millimetres, whereas in the frizzly-haired Papuans and Melanesians, with whom the Andamanese have often been associated, the height almost invariably exceeds the breadth.

The general form of the eranium in its most characteristic development as seen in the *norma verticalis* (Plate IV, Fig. 2) is a broad, but by no means regular oval, narrow in front, the sides nearly straight, and rapidly diverging to the parietal eminences, which are situated very near the posterior part of the cra-

\* "Phil. Trans.," 1861.

† West Riding Asylum Medical Reports, 1873 and 1876.

‡ "Revue d'Anthropologie," Jan. 1879.

nium. The great prominence of the parietal eminences, to which the high latitudinal index is mainly due, is more marked in the female than the male skulls; the latter being usually more regularly oval. The specimens figured (Plate IV, figs. 1 and 2), present two rather extreme forms. The straightness of the outline between the external orbital processes of the frontals and the parietal eminences is due to considerable flattening of the temporal fossæ.

The frontal region is round, smooth, and in horizontal profile, slopes at a very even curve from the nasion to the bregma. The frontal eminences are very little developed. The main characteristic of this region is the complete absence of glabella, and of superciliary ridges. In the older males only is there any indication of these prominences. In the females, as is usually the case, the anterior part of the frontal bone rises more vertically, and turns more abruptly to the horizontal upper surface. The bregma is so situated that when the cranium is placed with the axis of vision horizontal, the anriulo-bregmatic line has always an inclination forwards at the upper end. In Europeans, this line is generally vertical or may fall backwards. The general contour of skull, as seen from the side (*see* Plate II), is as characteristic as is its horizontal outline. Rising gradually and evenly from the face to the bregma, it then continues nearly horizontal to the middle of the sagittal suture, and then falls very abruptly to the lambda, and below this spot curves in rapidly towards the foramen magnum. Although the occipital region is thus greatly curtailed, its contours are finely rounded, and never present any of that absolute flattening or truncation which would indicate interference with its form by artificial pressure. The small development of the cerebellar fossæ and of the lower part of the occipital region generally is one of the most characteristic features of the cranium. This is indicated in the size of the basilar angle,\* which averages as much as 28°. In many of the specimens there is a slight transverse depression behind the bregma, distinctly affecting the upper contour of the skull, but this is absent in about half the number. Much more constant is a longitudinal median depression around the posterior half of the sagittal suture, especially at the region of the obelion. In many cases, especially among the females, in which the parietal bosses are large, this is very marked, and gives a heart-shape to the upper surface of the skull when seen in certain positions. More or less flattening of this region is found in almost all.

Seen from behind, the skulls have all a pentagonal form, and

\* The angle NBY, Broca, "Instructions Craniologiques" (1875), p. 92.

the greatest breadth of the parietal eminences is situated at the junction of the upper and middle third of the height. The degree at which the sides slope out from the base to the parietal eminences, and the difference to which this takes place in the two sexes can be estimated by comparing the average biauricular breadth taken on the squamosal immediately above the ridge running backwards from the zygoma over the meatus auditorius externus, which is 113·7 in the males, and 108·9 in the females, with the maximum parietal, which is 134·9 in the males, and 132·8 in the females, or as 100 to 118·7 in the males, and 100 to 121·9 in the females.

The general surface of the cranium is smooth, and the muscular ridges are little pronounced. The limits of the attachment of the temporal muscles are only feebly indicated, and the occipital curved lines and theinion are in most cases scarcely discernible. Of course there is some difference between the sexes in this respect, but in only one of the males does theinion make any prominence distinctly visible in the side view of the skull. The mastoid process is generally fairly developed, conical and pointed in both sexes, but always larger in the males than in the females. In four of the twelve males do they extend below the level of the condyles, and in one of the twelve females.

In the character of the sutures there is considerable variation, but as a general rule they are between the extremes of great complexity and of simplicity, though the latter condition may be said to preponderate. There are no very marked examples of either extreme in the series. Wormian bones are present in the lambdoidal suture in thirteen out of twenty-three crania examined. There are no cases of epactal or inter-parietal bones. With regard to metopism, or persistence of the frontal suture, one only out of twenty-nine examined by me presents this condition, it is a young female belonging to Mr. Ball. But it is curious, and nothing could better illustrate the necessity of founding such observations upon considerable series, that among six other examples of Andamanese skulls described, viz., two at Paris, and four in the possession of Dr. Barnard Davis, as many as three are recorded as metopic. This will give a total of four in thirty-five known examples of skulls of the race.

Out of forty-six cases (including both sides) in which the condition of the sutures of the region called by Broca "pterion" could be examined, the squamosal articulated with, or at least reached, the frontal in six, in two of them joining it for a space of fully 12 millimetres, though in both instances (one female in the British Museum, and one male at the Netley Hospital) this occurred on one side of the head only. In eight cases the sphen-

parietal suture was less than 5 millimetres in length; in eight cases there are epipteric bones or accessory ossicles at the upper part of the sphenoid, and the remaining twenty-four are in what may be called the normal condition, though the suture is in every case very short.

Consolidation, complete or partial, of the cranial sutures, has taken place in seven out of twenty-nine crania. In three it is complete, yet in none of them are any of the teeth lost, or even presenting more than a moderate degree of wear. In the four examples of partial consolidation, the coronal has united at an earlier period than the lambdoidal; in fact, the former is completely consolidated in all four, while the latter is either entirely free or only partially consolidated. This corresponds with Gratiolet's view, that in the savage races the anterior, and in the elevated races the posterior cranial sutures are first to consolidate. My impression, judging from the condition of the teeth and general aspect of the skull, is that sutural union takes place in the skull at an earlier period than in ourselves, but at present this can scarcely be considered as demonstrated.

With regard to the projection of the zygomatic arches, of eighteen skulls especially examined with this view by the method adopted by Mr. Busk, all except two are phænozygous; in these two the zygomata are but just covered; in several of the others only the edges appear on each side; in none is there much projection.

The skeleton of the face of the Andamanese is even more characteristic and uniform in appearance than that of the cranium. The profile is remarkable for its straightness, caused by the absence of glabella, or of any sinking in at the root of the nose, and by the small size and flatness of the nasal bones. A straight line drawn from the centre of the forehead to the alveolar point, sloping moderately forward below, corresponds very nearly with the main points of the outline of the face. The malar bones are well-developed and prominent. The outer margin of the orbit stands somewhat more forward than it does in Europeans, though far less than in the Mongolian races, the average nasi-malar angle\* being  $135^{\circ}$ , and when the cranium is horizontal, the lower margin is in advance of the upper. The orbits are always more or less round, with fine, sharply-defined borders. The general average orbital index of the whole series is 910, so that they come into Broca's *megaseme* division. The

\* The angle formed between two horizontal lines, meeting at the most depressed point of the nasal bones in the middle line (apex of the angle), and resting on the middle of the outer margin of the orbits. In Europeans, the average angle thus formed is  $131^{\circ}$ ; in African Negroes,  $134^{\circ}$ ; in Australians,  $135^{\circ}$ ; in all the true Mongolian races the average exceeds  $140^{\circ}$ .



difference between the sexes is not so great as in some races, though, as usual, the females have a somewhat higher index than the males, viz., 915, that of the latter sex being 906. The highest index is 971, the lowest 857. None, therefore, are microseme.

The most characteristic part of the face is probably the inter-orbital region, which is always broad and flat, and with scarcely any definite depression at the root of the nose. In this respect there is a considerable resemblance to the Mongolian races. The ascending or frontal processes of the maxillæ are, as pointed out by Quatrefages, very broad and flat, and with a convex surface in horizontal section. A much larger proportion of these processes is seen in the front face than in most skulls.

The nasal bones have a very characteristic shape, to which there is scarcely an exception in the series. They are small, flat, and very even in width, the sides being more nearly parallel than in most races. As shown by the indices (*see* Table I) the form of the nasal aperture presents some variations ranging from 447 to 578, both, however, very exceptional cases. The average nasal index of the whole series is 512, there being no marked difference between the two sexes. They are thus, as a race, mesorhine, with a tendency towards platyrrhiny. Taken individually, the twenty-four skulls are thus distributed: eighteen are mesorhine, five platyrrhine, and one leptorrhine.

The most characteristic form of the nasal aperture is triangular, the sides nearly straight, diverging moderately as they descend, and with a very straight inferior border, but a more oval form of aperture very frequently occurs. The inferior border itself varies much in construction. In some it is sharply defined and single, the lateral margin of the aperture being continued along the lower border into the spine (Plate III, Fig. 1), as is usually the case in Europeans. In others the lateral margin passes down on to the alveolar surface, separated from the spine and its lateral continuations by a distinct groove, so that the inferior border becomes double (Fig. 2). In some few the border is smoothly rounded, the floor of the nasal chamber passing insensibly on to the alveolar surface of the maxilla.

The nasal spine is always fairly developed, but never large. No. 2 of Broca's scale represents its usual condition, but there are cases in which it approaches No. 3.

The palate is generally flat, and neither broadly parabolic, nor hypsiloid, but rather between the two, and inclined to the V-shape, being usually narrower in front, or hyperbolic (Broca), with the molar series rectilinear and diverging posteriorly.

Among the numerous and sometimes complicated methods proposed for estimating numerically the important differences in the forward projection of the lower part of the face, I

cannot but give the preference, at all events for the present, to the very simple one of comparing the relative length of the basi-nasal and the basi-alveolar lines; the former measured from the basion (middle of anterior margin of foramen magnum) to the nasion (middle of naso-frontal suture), the latter from the basion to the most prominent part of the alveolar border. This is exceedingly easy of application, especially with the sliding calipers, with which all the cranial diameters mentioned in this communication are taken,\* and if in some cases not strictly accurate, in the large majority it certainly gives the desired information. Taking the average of skulls of all races, these two lengths are not far from being equal, but in the white races the lower measurement (basi-alveolar) very rarely exceeds the upper (basi-nasal), while in the black races it almost invariably does so; and the numerical ratio between the two dimensions, or the "alveolar index†" as it may be called, accords so truly with what is seen by the eye, and obtained by all other more complex and difficult systems of measurement (as those by which the various facial angles, and angles of prognathism are estimated), that there can be no doubt of its value. The basi-nasal length being taken as 1000, the ratio of the basi-alveolar length to it will give the required index.

When the index is below 1000, as in most Europeans, the skull may be called *orthognathous*; when it is above 1000, as in most negroes, it may be called *prognathous*; but following the usual example of a three-fold division in such cases, it will be most convenient to admit an intermediate category for skulls of an index of 1000, and two figures on each side, say between 980 and 1030, which may be called *mesognathous*.

It certainly happens that in some cases, as those in which the front teeth have been lost and the alveolar walls absorbed, the alveolar index cannot be estimated. In others it fails to give the true position of the face in relation to the cranium, especially where the lower edge of the basi-occipital bone is in an abnormal position, as for instance in skulls having a tendency to platybasic change, when the basion is elevated towards the vertex. In such cases the basi-nasal length is diminished and the basi-alveolar relatively increased, without any real change in the form or position of the upper jaw, and the index would express a greater degree of prognathism than really exists, but

\* A figure of this instrument is given in the Introduction to Part I of the Catalogue of the Specimens illustrating the Osteology and Dentition of Vertebrated Animals, in the Museum of the Royal College of Surgeons, 1879.

† A term which may be used to distinguish it from Mr. Busk's "gnathic index," founded on measurements nearly the same (the centre of a line connecting the external auditory meatus being used instead of the basion), but which is the *difference* and not the *ratio* between the two measurements.

in the case of the Andamanese skulls there appears to be no difficulty on this score, as there is little variation among them in the form of the *basis cranii*.

The average alveolar index of the twelve males is 1014, of the twelve females 1022, or for both sexes 1018, so that they come into the mesognathous group, though just on the verge of the prognathous. The maximum is 1080, the minimum 957. The twenty-four when classified give eight as prognathous, eleven mesognathous, and five orthognathous.

The facial angle which has its apex at the alveolar point, and one limb passing through the centre of the external auditory meatus and the other through the ophryon (the ophryo-alveoloauricular angle), measured by Broca's median goniometer, gives exactly corresponding results. It averages in the twenty-four skulls  $65.5^\circ$ . In Australian skulls this angle is  $64.5^\circ$ , in Italians  $68.0^\circ$ . Thus the form of the face of the Andamanese, estimated by this angle, holds exactly the same relative position between that of the Australians and the Italians, as it does when estimated by the alveolar index, the latter being, in round numbers, 1040 in the Australians, 1020 in the Andamanese, and 970 in the Italians.

The characters of the mandible present great uniformity throughout the series. As distinguished from the same part in a well-formed European skull, the horizontal ramus is very shallow, and of nearly even height throughout, the mental prominence little developed, the ascending ramus low, and broad from before backwards, the coronoid process ill developed, never or very rarely exceeding the condyle in height, and the sigmoid notch shallow.

The dimensions of the different specimens, taken according to Broca's "Instructions," are given in Table I.

#### *Teeth.*

From many of the skulls the teeth have been lost, either wholly or partially; in some few they are all present.

Loss of teeth during life, and caries, are both excessively rare in the series. There is but one case out of all the teeth examined which shows a spot affected with disease.

The malposition of the premolars, noticed in one of the specimens belonging to the Middlesex Hospital, described by Mr. Busk, and stated by Dr. Charles Smith to be common,\* does not occur in any other case among the present series, but crowding and consequent overlapping of the incisors, especially in the lower jaw, is very frequent. In two cases the lower canines are both rotated on their axes, so that their lingual

\* "Trans. Ethnol. Soc.," vol. iv, p. 210.

surfaces are directed towards the middle line, being in contact with the outer incisors (Plate III, Fig. 2). In one other, a tolerably aged subject, an upper canine is permanently retained in the alveolus, the apex only appearing.

In dimensions the teeth appear equal to the average of those of Europeans, and therefore may be considered large in relation to the general size of the body.

Superior dental prognathism or anterior projection of the upper incisors is marked in many cases, though not universal. The second molar rarely equals and never exceeds the first in size in either jaw. The third is invariably smaller, though it is present on both sides and both jaws in every case examined but one, in which (a cranium only), being rather an old subject, it may possibly have been lost. In the upper jaw its roots are usually connate in those cases in which their condition can be ascertained, though in one instance at least there are three distinct roots. In the lower jaw they are frequently double. The cusps of the molar teeth appear to be normally developed, but their condition is not seen to advantage in many of the specimens, as the surface is more or less worn in nearly all.

### *Pelvis.*

The sexual differences in the lower part of the pelvis, especially in the form of the subpubic arch, are well marked, so that there is no difficulty in recognizing at a glance to which sex each of the seventeen pelvises, available for examination, belongs. In general size and development, however, there is very little difference between those of the males and females. Notwithstanding their very small size they are strong and stout, and not one, even among the females, presents any deficiency of ossification in the middle of the iliac fossa, and many of them are not even diaphanous at this part when held to the light.

As a means of characterising different human races, the pelvis will probably be found to be, after the cranium, one of the most important parts of the skeleton. The very marked difference of conformation between the pelvis of man and that of the nearest allied animals would certainly lead to the belief that this might be so.

Unfortunately, owing to the deficiencies of our anthropological collections, the subject has not yet been fully worked out, for the individual differences in pelvises are so great, that, as in so many other parts of the skeleton, the examination of one or two specimens is of not the slightest use, and it is only by means of the averages of a large series of each group that information of any

scientific value can be obtained. A system of measurement more uniform and commodious than those hitherto adopted should also be devised. Though not unmiudful of the labours of Verneau\* and others in this direction, I have endeavoured once more to define and arrange in convenient order the measurements which appear most likely to give useful results in comparing pelves one with another, and have given the results as regards the Andamanese pelves in Table II.

But independently of these detailed measurements, which are set down for the benefit of those who may at a future time be able to derive some value from them by comparisons with similar observations on a sufficiently extended scale from other races, there is much interest in the study of "the pelvic index," or the ratio of the antero-posterior to the transverse diameter of the brim, the latter being taken as 100. This is the key to the general form of the organ, and gives the most concise numerical estimate of the differences between the pelves of different individuals and races. As is well known, the ratio is higher in children than adults, and is higher in all the anthropoid apes than in man. A high index is therefore an indication of an infantile, or of an animal tendency. In this, as in most other pelvic measurements, the two sexes must be taken separately, so that our already too scanty available numbers for averages are still further diminished. The interest of the following facts is however sufficiently significant, and will, I trust, stimulate further observations in the same direction. Verneau gives the average pelvic index of sixty-three male Europeans as 80. In eleven measured by myself it is 81. Seventeen male negroes, according to Verneau, have an average index of 89. Ten male Australians measured by myself give an average of 98. From these figures, and others founded on a more limited number of different groups of the black races, it may be taken as an established fact, that in these races the pelvic index averages considerably higher than in Europeans. The Andamanese follow the same rule, the eight male pelves measured giving an average as high as 101,† the minimum being 92·6, and the maximum 116·2, the longest and narrowest human pelvis I have ever met with. The female pelves give similar results. In Europeans, the average index of thirty-five measured by Verneau is 78, of fourteen measured by myself almost exactly the same. The average of the nine female Andamanese is 95·2, the minimum being 86·4, the maximum 107·8. It will be observed that in both cases the minimum among the Andamanese is very considerably above

\* *Le Bassin, "dans les Sexes et dans les Races."* Paris, 1875.

† Fritch gives the same for the average of six male Kafir pelves.

the average of the Europeans; and that, perhaps contrary to what might have been expected, there is greater difference between the two sexes in the former than in the latter, but this may be due to insufficiency in the numbers observed. The form of the superior aperture in a very characteristic example of each sex is shown in Pl. V.

*Order and Definition of Pelvic Measurements.*

1. Inter-acetabular width. Distance between the posterior margins of the two acetabula, at the junction of the ilium and the ischium; the point for convenience called "*cotylon*."

2. Width between iliac crests. The maximum width between the outer edges of the crests, wherever that may be. This is the maximum width of the pelvis.

3. Width between the anterior superior spines of the ilium. The calipers being placed on the centre of the most prominent part of the eminence.

4. Width between ilia posteriorly. The minimum width between the ilia behind the sacrum.

5. Sacral width. The maximum width of the first sacral vertebra.

6. Width of third sacral vertebra. Its maximum width.

7. Width between spines of ischia. Measured between the extremities of the spines. These, unfortunately, are often broken.

8. Width between tuberosities of ischia. The maximum width between their external surfaces.

9. Sacral length. Length of the five united sacral vertebræ in a straight line, measured from the middle of the anterior edge of the body of the first, to the corresponding part of the fifth.

10. Total height. From the highest part (about the middle) of the iliac crest to the lowest part of the tuber ischii.

11. Height of ilium. From the highest part of the crest to the cotylon.

12. Length of crest of ilium. In a straight line between the anterior superior, and the posterior superior spines.

13. Transverse diameter of the brim of the pelvis. The greatest transverse diameter between the ilio-pectineal lines.

14. Antero-posterior diameter of the brim. From the middle of the anterior margin of the upper border of the first sacral vertebra to the nearest point on the inner surface of the symphysis pubis.

15. Height of acetabulum. From middle of the upper border below and rather behind the anterior inferior spine of the ilium, to the opposite ischial border.

16. Width of acetabulum. From the middle of the pubic border to the cotylon.  
 17. Height of obturator foramen.  
 18. Width of obturator foramen.  
 19. Inter-obturator width. Width between the inner margins of the two obturator foramina.  
 20. From cotylon to symphysis pubis.  
 21. Sub-pubic angle.  
 22. Pelvic index.

$$\frac{\text{antero-posterior diameter of brim} \times 100}{\text{transverse diameter.}}$$

23. Index of height.

$$\frac{\text{greatest height} \times 100}{\text{inter-acetabular width.}}$$

24. Sacral index.

$$\frac{\text{maximum width} \times 100}{\text{maximum length.}}$$

#### *Scapula.*

Little attention had been paid to the form of the scapula as a race character, until the publication of a memoir by Broca in the *Bulletin* of the Paris Anthropological Society of last year.\* In this communication it was shown that one of the principal modifications of the form of this bone could be expressed by an index constituted by the ratio between the two chief diameters of the bone; *i.e.* the length, measured from the posterior superior angle to the inferior angle, and the breadth, from the middle of the posterior margin of the glenoid cavity to the point on the posterior or vertebral border from which the spine arises. The ratio of the length to the breadth, the latter being 100, is called the *scapular index*. In the anthropoid apes the index varies between 70 and 100. In most of the lower forms of monkeys and other mammals, it is considerably higher. A high index is therefore a sign of inferiority. Broca found that the average scapular index of twenty-three Europeans was 65·91. In order to verify this result, and to obtain a good standard of comparison with other races, my colleague, Dr. Garson, has measured two hundred scapulæ of Europeans, and finds the average index to be 65·2, showing a remarkable agreement with Broca's figures, but as the number of specimens measured was greater, the latter may probably be considered as more

\* Tom. I (3me ser.), p. 66, 1878. See also 'On the Scapular Index as a Race Character in Man,' by W. H. Flower and J. G. Garson. "Journal of Anatomy," vol. xiv., p. 13, Oct., 1879.

accurate. The twenty-five skeletons of negroes in the Paris Museum gave an average scapular index in Broca's hands of 68·16. In the collection under my charge, the number of negro skeletons is very small—only three in fact—but from the six scapulæ (for it is always desirable to measure both, as variations are frequently met with on the two sides), an average of 71·7 was obtained; and Australians (of which we have twice the number) gave an average of 68·9.

As only such scapulæ as have the epiphyses united ought to be measured, otherwise the relative dimensions will be considerably altered, several of the Andamanese skeletons could not be included in the available series. This precaution reduced the total number of scapulæ available to twenty-one. These gave an average index of 69·8, showing quite satisfactorily that in this character, as in the pelvic index, and, as will be shown, in the proportions of the long bones of the limbs, the Andamanese stand in close relationship to the negro, and also to the Australian, and differ widely from the European.

A distinct suprascapula notch is very rare; it occurs in fact in only three out of the whole number of bones examined. Generally there is a gradual and shallow excavation of the whole upper border, as in the anthropoids. In some cases, especially among the females, whose scapulæ are of remarkably diminutive size, the whole border is deeply excavated. In two cases the notch is bridged over and converted into a foramen. The surface for the attachment of the *teres major* is often well developed, forming a strong triangular projection on the anterior border.

#### *Limb Bones.*

The clavicles appear to be very small in proportion to the length of the other bones. The average length in the males is 116·0 millimetres, in the females 107·0, which is, as compared with the femur, as 29·1 to 100 for the males, and 28·3 to 100 for the females. In the average European male skeleton the clavicle is to the femur as 32·7 to 100.

Perforation of the supracondylar fossa of the humerus is very common, especially among the females, in which sex it occurs in eleven out of seventeen cases examined, while among sixteen humeri of males, there are only five instances of this condition. This is evidently in relation to the more powerful development of the bone in the male sex. In some of these the deltoid and other ridges for muscular attachment are very strongly expressed.

The form of the tibia varies also with muscular development, but on the whole it is usually more compressed than in Euro-



peans, though not perhaps to the extent of true platycnemy. The average latitudinal index of the tibia, or ratio between transverse and antero-posterior diameters at the middle of the bone, is, in sixteen male tibiæ 647, and in seventeen females 675: while, according to Busk, the mean of the same index, in thirteen European tibiæ, is 730.

Attention was first drawn to the fact that the proportions of the different segments of the limbs might differ in various races by the announcement in 1799, by White, of Manchester, since amply confirmed, that the forearm of the negro is proportionally longer than that of the European. Relative lengths of bones are far more difficult to estimate on the living than on the skeleton; but, unfortunately, skeletons of most races are so rare in collections, that we have at present but few reliable data on the subject. As in other parts of the structure, one or two examples are of little or no use, as in all races there are great individual modifications. It is only when a sufficient number can be obtained on which to base a fair average, that any satisfactory law can be established. The numbers in the case of the Andamanese are sufficient, at all events, for a very good approximation, although slight modifications in the averages will perhaps have to be made with further augmentation of materials.

The measurements of the individual bones are given in the appended tables, but I will here point out the principal results, both sexes being taken together, as there is but slight variation between them in this respect.

The first ratio or index is that obtained by the comparison of the upper and lower limbs compared with each other; the *inter-membral* index, or the length of the humerus and radius added together, compared with that of the femur and tibia, the latter being taken as 100. This ratio in the nineteen Andamanese skeletons is 68·3; in fourteen Europeans, measured in the same manner, it is 69·2; showing a slight diminution in the length of the arm of the former as compared with the latter. This has also been found by Broca to be the case with African negroes; the index given for them being 68·27, that of Europeans 69·73. This is caused entirely by the relative shortness of the humerus in the black races, which is the more singular, as it is a character which rather separates than approximates them to the anthropoid apes.

The *femoro-humeral* index (or ratio of the humerus to the femur, the latter being taken as 100), is about 100 in the chimpanzee, 120 in the gorilla, and 130 in the orang; in nine Europeans, according to Broca, 72·20, in eleven normal adult Europeans, from my own measurements 72·9, in sixteen negroes (Broca) 68·97, and in the nineteen Andamanese 69·8.

The *femoro-tibial* index is the ratio of the length of the tibia to the femur, the latter being 100. The average index of fourteen Europeans, measured by myself, is 82·1, the average of eleven Australians, also measured by myself, 84·9; of twenty-five negroes, according to Humphry, 84·7; of the nineteen Andamanese, almost exactly the same, viz., 84·5.

The *humero-radial* index or the length of the radius compared to the humerus, is perhaps the most important of these indices as presenting greater and more constant differences in different races. In all the anthropoids it is higher than in man, varying from 80 in the gorilla to 100 in the orang. Broca gives 73·9 as the average of nine European skeletons at Paris, and by a singular coincidence I have obtained exactly the same figures from quite independent measurements of fourteen skeletons in London. Eleven Australians in London give 76·5. Fifteen negroes in Paris give, according to Broca, 79·4; the nineteen Andamanese as high a figure as 81·0: higher than in any other known race.

It should be mentioned that the measurements given of all bones are the maximum lengths in a direction parallel to the long axis of the bone, and in the case of the tibia include both the spine and the malleolus.

Unfortunately the bones of the hands and feet are extremely defective in nearly all the skeletons at my disposal, so I must defer any observations of their peculiarities until better opportunities of examining them should occur.

#### *Conclusions.*

The chief outlines of the physical characters of the Andamanese, or at all events of that portion of the race dwelling in the neighbourhood of Port Blair, may now be considered as fairly well known.

The hair is fine and curly and crisp, what is commonly called "woolly" or more properly "frizzly." A specimen sent home by Mr. Man, and for some of which I am indebted to General Lane-Fox, very much resembles that of the Bushman, though not quite so small or so much flattened when seen in section. As usual, the individual hairs differ somewhat in proportion, but there are many examples in which the short diameter is not more than half the length of the long diameter, so that it must certainly be placed among the most elliptical or flattened of any human hair known.

The general colour of the skin is described by all observers as quite as black as that of the majority of Negroes, whether African or Oceanic. The features, however, judging from photographs, possess little of the Negro type; at all events, little

of the most marked and coarser peculiarities of that type. The projecting jaws, the prominent thick lips, the broad and flattened nose of the genuine Negro are scarcely to be recognised in the Andamanese. All these characteristics of most of the black races are softened and refined away in the living face, as we have seen them to be in its osseous framework. In consequence of this, it has seemed doubtful whether, in a classification founded on physical characters, they ought to be placed in the same group with the other black and frizzly-haired races.

It is the opinion of many anthropologists that the character of the hair is one of primary importance in the classification of man. It would seem *à priori* very unlikely that, whatever the primitive ancestors might have been, hair so peculiar as that of the Negro and the Andamanese should have been developed independently in two distinct stocks. But still if it had been shown that the other essential physical characters of the Andamanese departed from those of the Negro and more closely resembled those of some other, as, for instance, one of the straight-haired races, the value of this character as indicating true affinity would be greatly shaken. To follow out such an argument, it is necessary to separate what is essential from what is incidental or merely superficial in the characters on which the comparison is based. Such a separation lies at the root of all problems of this nature that zoologists are called upon to solve, and in proportion as the difficulties involved in this delicate and often perplexing discrimination are successfully met and overcome, will the value of the conclusions be increased. These difficulties, so familiar in zoology, are still greater in the case of anthropology. The differences we have to deal with are often very slight; their significance is at present very little understood; our information is often extremely scanty, and when otherwise, is usually overladen with irrelevant and useless details; for in the present state of the science, not knowing what may be of importance and what not, those who collect facts have been obliged to heap together everything that appears capable of being recorded, believing that possibly at some future time it may prove of value—as witness the elaborate tables of cranial measurements, from which hitherto no useful results have been derived. It is certainly time now to endeavour, if possible, to discriminate characters which indicate deep-lying affinity from those that are more transient, variable or adaptive, and to adjust, as far as may be, the proper importance to be attached to each.

The study of such a race as the Andamanese would throw much light not only on their own affinities, but also upon the general value of anatomical characters in the classification of

man, if it could be thoroughly carried out by comparison with an equal number of individuals of other more or less related races, treated in the same manner. But, unfortunately, at present this cannot be. Of how few groups of the human species do we possess even a fair approximation to the average proportions of the limb bones, of the pelvis, even of the better-studied bones of the face and cranium?

Of the people most nearly allied to the Andamanese, the other Negritos, scattered here and there in the interior of various islands of the Malay Archipelago, but rarely, if ever, now found in a state of purity, we know really next to nothing. In the great work, "*Crania Ethnica*," now being published by Quatrefages and Hamy, all available sources of information regarding them have been laid under contribution, and their osteological characters, as deduced from the few specimens of crania in European museums, and their geographical distribution, have been described as fully as the scanty materials will permit. Their common characters are diminutive stature, dark complexion, frizzly hair, and short round heads. In details of cranial and facial conformation, the skulls that have been described and figured as belonging to this race, differ much among themselves, and certainly differ from the Andamanese; but then, as before said, the circumstances under which they live and have lived for centuries, with no impassable barriers separating them from Malays and other different races, have interfered with their purity. In the case of two skulls in the Museum of the College of Surgeons from the Philippines, which Quatrefages has attributed to Negritos, there is very little evidence, either external or internal, as to their origin, and one of them decidedly appears to me to be Malay. The Aeta or Atc' figured by Dr. Barnard Davis, however, does appear (as before mentioned) to resemble more closely the Andaman natives, and it is highly probable, although some of the evidence hitherto brought forward is not conclusive, that a race of which the Andamanese are members, was once distributed over the greater part of the Malay Archipelago as far as New Guinea, and perhaps (although here proof is scarcely forthcoming at present) over the southeastern portion of the mainland of Asia. One difficulty in investigating the evidence of this question, is the resemblance which the skulls of another race inhabiting nearly the same area, the Malays, bear in many points to those of the Negritos, so that a combination of the frizzly hair of the Papuan with the round skull of the Malay, in a mixed race, might easily, though perhaps erroneously, be attributed to Negrito influence.

Granting that there is a distinct group of men, specially exemplified by the Andamanese, for which the term Negrito, first

applied by the Spaniards to those who inhabited the mountainous districts in the interior of Luzon, may be retained, what relation do they bear to the other frizzly or so-called woolly-haired races? These races at the present time occupy the whole of the continent of Africa south of the Sahara Desert, excepting such parts from which they have been displaced by European or Asiatic invaders, and also the greater number of the islands of the Western Pacific Ocean. This geographical distribution leads to a convenient division into African and Oceanic Negroes. The Negritos, it will be observed, are exactly interposed between the two, touching the area of, and intermingling with, the Oceanic Negroes in the East, but separated on the West from the African Negroes by the wide space of the Indian Ocean.

With the Oceanic Negroes, or Melanesians, as they are now commonly called, we might naturally suppose they had most in common. But this is not the case. Although the Melanesians vary much in stature, none are so small as the Andamanese, and some are fully equal to the average of the species. Their crania, whenever they are met with in a pure state, are remarkably long, narrow, and high; a peculiarity which has given rise to the word *hypsi-stenocephalic*, applied specially to them. The pure Fijians are perhaps the most dolichocephalic race in the world, and the New Caledonians and the New Hebrideans come near them. In this respect they are, therefore, as distinct as possible from the Andamanese. It is true that at the southern and northern extremities of their area of distribution, the head form varies from the ordinary type, becoming less compressed. The Tasmanians present an approach to brachycephaly\* and so do some of the Papuans. In the latter case intermixture with Negritos or Malays may be suspected, but this cannot be the case with the former. In no other respect, however, do they resemble the Andamanese. The projecting supraciliary ridges, the low orbits, the wide nasal aperture and the prognathism common to all Melanesians, and distinguishing them from Negritos, are all exaggerated in the Tasmanians.

As is well known, the African frizzly-haired races are mostly of moderate or tall stature, but there are among them some, as the Bushmen of the South, and others less known from the Central regions, as diminutive as the Andamanese. Dolichocephaly prevails among them, as among their Oceanic allies,

\* The average latitudinal index (76·3) of the Tasmanians given in the Catalogue of the Museum of the Royal College of Surgeons (1879), founded on the measurement of fourteen individuals is probably higher than would be given by a larger or more fairly representative series. Five crania in the Museum of the University of Oxford have an average index of only 74·1.

though not quite to the same extent, and a small race of round-headed Negroes from West Africa are mentioned by Hamy under the name of Negrillos, but as yet without details. Although as prognathous as the Oceanic Negroes, and more platyrrhine, as a general rule the orbit of the Africans is higher and rounder, and the forehead smoother, not unfrequently presenting the same absence of glabella and brow ridges seen in the Negritos of the Andamans. But from the majority of African Negroes, as from the Melanesians, the Negritos differ in the rounder brain-case, as shown by a cephalic index of 80 or upwards; smooth, flat brow; absence of glabella and of ridges generally for muscular attachments; rounder and thinner-edged orbits; narrower noses and less projecting jaw bones. The question to be considered is whether these differential characters outweigh those of agreement, as the nature of the hair, the colour, the form of pelvis, and the general proportions of the limbs.

If the general form of the cranium as regards breadth compared to length is to be considered of primary importance in classifying races, as Retzius and his followers thought, the Andamanese must be placed in a totally distinct division from the greater number both of Oceanic and African Negroes; but the variations seen in certain groups of both of these divisions, and the well-known cases in other races, as the Eskimo and the Asiatic Mongols, clearly allied in other respects, yet differing most widely in cranial form, show that this character can only be placed in the second rank of importance.

In estimating the value of many of the differences, we can scarcely fail to observe that they are of very much the same kind as those seen between the smaller and larger species or varieties of various groups of animals, and also between the young and the old of the same species. If the cranium of a small *Cercopithecus* or Macaque be compared with that of a Baboon; a Chimpanzee with a Gorilla; or a young Gorilla or Orang be compared with an adult of the same species, the relation will be seen to be very much the same as that between a Negrito and a large powerful Negro or a New Hebridean. There is certainly much that is child-like in the physical characters of the Andamanese, especially in those of the cranium. The smoothness of the brow, the high orbital index, the low alveolar index, are infantile characters. They are all found in the children of the Negro and Melanesian races.

Some characters, as the brachycephaly, seem special to the race; but in many of the others, when viewed in the light just indicated, there seems to be nothing which should so far contradict the indications derived from other sources, as to cause







the Negritos to be removed into a distinct primary group of Man. I would rather look upon them as representing an infantile, undeveloped, or primitive form of the type from which the African Negroes on the one hand, and the Melanesians on the other, with all their various modifications, may have sprung. Even their very geographical position in the centre of the great area of distribution of the frizzly-haired races seems to favour this view. We may, therefore, regard them as little-modified descendants of an extremely ancient race, the ancestors of all the Negro tribes. It is, however, equally open to anyone to entertain the supposition that many centuries of isolation and confinement to a limited space has caused them to retrograde to their present condition from one more fully developed, and that instead of representing an ancient form preserved in its purity, they may be a type of comparatively recent growth. Whichever hypothesis be ultimately adopted, their relationship, as shown by physical characters, to the other black races, is, I think, demonstrated, and a step thus gained in solving the complicated problem of the classification of the divisions and sub-divisions of the human species.

#### NOTE TO TABLE I.

For convenience of comparison, the greater number of the cranial measurements given are taken on the plan recommended in the "Instructions Craniologiques et Craniometriques," drawn up by Broca, and published by the Anthropological Society of Paris in 1875. Certain cases of deviation from these instructions will, however, require explanation.

1. *Capacity*.—The cranial cavity is filled to the utmost with mustard seed, poured in through a funnel of narrow aperture and well shaken. The seed is then measured in Busk's chromometer, being poured in through the same funnel and frequently shaken.

2. The length is measured in front from the optryon instead of the glabella, which is properly a part of the face and not of the cranium.

14 to 17. The transverse arcs are measured from the spot on the ridge immediately above the middle of the external auditory meatus (posterior root of the zygoma), where it is crossed by the auriculo-bregmatic line (line from the centre of the auditory meatus to the bregma). They pass to the corresponding spot of the opposite side over the most prominent part of the frontal, parietal, or occipital bones, as the case may be, or the bregma (No. 15). The last corresponds with the *courbe sus-auriculaire* of Broca.

23 to 26. The projections are taken when the cranium is

placed on a board with the visual axis (or at least a line which probably represents this axis, passing through the optic foramen and the centre of the anterior aperture of the orbit) horizontal. The facial projection is that part in front of a vertical line passing through the ophryon; the anterior cerebral, the portion between this and a vertical through the basion; the posterior cerebral, that part situated behind the basion.

29. The alveolar index is fully explained in the text at p. 119.

46. The facial angle is that of which the alveolar point is the apex, the limbs passing through the ophryon and the auricular point respectively, taken by means of Broca's median gomometer.

47. The nasi-malar angle is explained at p. 117.

48. The basilar angle is formed between a prolongation of the basi-nasal line and the plane of the foramen magnum, the apex being at the basion. NBY of the "Instructions," p. 92.

The measurements of the mandible correspond with those of the "Instructions," except that Nos. 3, 9, 10, and 12 are omitted and one is added, the coronoid height (No. 53) being the vertical distance between the summit of the coronoid process and the lower border of the mandible.

#### DESCRIPTION OF THE PLATES.

All the figures are from specimens in the Museum of the Royal College of Surgeons of England. The numbers refer to the Catalogue of the Osteological Specimens (1879). They are drawn half the size of nature, on a geometrical projection, the outlines being traced by means of Broca's stereograph, and then reduced. The plane of the visual axis is horizontal in the figures in Plates I and III, and vertical in those of Plate IV.

Plate II.—Side view of skull.

Fig. 1.—Male, No. 1205.

Fig. 2.—Female, No. 1214.

Plate III.—Facial view of skull.

Fig. 1.—Male, No. 1205.

Fig. 2.—Female, No. 1214.

Plate IV.—Upper surface of cranium.

Fig. 1.—Male, No. 1211. Narrow form. Latitudinal index, 78·9.

Fig 2.—Female, No. 1214. Broad form. Latitudinal index' 84·6.

Plate V.—Pelvis. Looking directly upon the plane of the upper aperture.

Fig. 1.—Male, No. 1206. Index, 1102.

Fig. 2.—Female, No. 1214. Index, 990.

TABLE II.—PELVIC MEASUREMENTS.

	1 Inter-acetabular width.	2 Width between iliac crests.	3 Width between ant. sup. spines.	4 Width between ilia posteriorly.	5 Sacral width.	6 Width of 3rd Sacral.	7 Width between spines of ischia.	8 Width between tuberosities of ischia.	9 Sacral length.	10 Total height.	11 Height of ilium.	12 Length of crest of ilium.	13 Trans. diam. of brim.	14 Ant. post. diam. of brim.	15 Height of acetabulum.	16 Width of acetabulum.	17 Height of obturator foramen.	18 Width of obturator foramen.	19 Inter-obturator width.	20 From Coty-lon to sym-physis pubis.	21 Subpubic angle.	22 Pelvic index.	
MALES.	1206	205	175	56	88	65	61	105	100	169	101	124	88	97	44	42	38	21	39	87	63°	1102	
	1207	213	188	50	93	69	—	115	92	179	106	134	95	95	44	44	41	25	36	95	74°	1000	
	1210	221	172	54	88	70	—	120	98	183	108	127	95	88	50	47	46	29	37	101	72°	926	
	1209	212	183	51	95	73	65	118	100	173	104	127	95	98	46	44	42	29	35	95	73°	1032	
	1217	156	217	192	66	99	73	125	108	187	116	132	101	95	47	47	48	34	33	102	65°	941	
	1208	130	208	186	62	87	68	97	86	164	99	115	91	85	45	43	29	26	88	88	55°	984	
	Oxford.	144	225	198	60	96	64	63	111	98	179	107	134	94	48	46	45	29	33	95	55°	979	
	B. M. Dr. Ingle	126	196	177	55	84	70	55	103	95	170	100	117	80	93	47	45	44	25	33	88	60°	1162
	Averages ...	141·9	212·1	183·9	56·8	91·3	69·0	63·6	111·8	971·2	175·5	105·1	126·3	92·4	92·9	46·4	44·8	43·4	27·0	34·0	93·9	64·6	1009·5
	FEMALES.	157	207	175	71	99	73	93	142	96	170	100	121	110	109	44	41	41	32	41	97	100°	991
		1212	150	204	62	94	75	82	130	97	164	99	117	102	100	45	41	42	28	45	97	85°	980
		1213	153	202	70	91	72	93	135	77	160	92	122	102	91	43	42	44	29	36	94	80°	892
		1203	146	185	65	93	71	81	127	88	165	111	119	97	96	42	40	37	26	44	96	85°	990
1214		147	202	175	63	93	76	88	90	160	95	119	100	92	42	39	38	26	42	91	95°	920	
1216		154	226	195	60	98	77	85	132	100	170	101	135	106	45	42	46	32	40	96	80°	915	
1218		149	197	172	64	98	76	—	128	99	172	105	126	110	47	44	43	27	44	96	80°	1078	
Oxford.		152	208	171	68	100	76	96	139	82	172	105	126	104	48	44	40	38	28	43	97	90°	942
Thomson (A).		144	203	183	58	91	71	79	118	78	156	100	118	103	39	38	43	31	32	88	73°	864	
Thomson (B).		144	203	183	58	91	71	79	118	78	156	100	118	103	39	38	43	31	32	88	73°	864	
Averages ...		150·2	203·8	175·4	64·6	95·2	74·1	87·1	130·9	89·7	165·4	100·9	122·6	102·9	980·0	43·2	40·8	41·3	28·8	40·8	94·7	85·3	952·4

TABLE III.—MEASUREMENTS OF LIMB BONES.

	Clavicle		Humerus		Radius		Femur		Tibia	
	r.	l.	r.	l.	r.	l.	r.	l.	r.	l.
R.C.S. ...	109	109	281	278	202	206	382	382	321	319
— ...	123	121	—	266	232	232	393	394	345	342
— ...	124	116	294	298	243	238	397	400	345	244
— ...	109	112	267	264	—	213	378	384	312	314
— ...	—	107	276	—	226	—	410	—	343	348
— ...	—	—	281	—	234	—	—	410	—	331
Oxford ...	121	121	281	277	228	228	—	403	—	340
British Museum (Mount)	130	130	310	308	255	253	442	439	366	364
British Museum (Ingle)	109	108	275	277	222	221	385	389	324	324
Average of ...	116·9		281·3		228·9		338·7		336·2	
R.C.S. ...	110	107	279	275	217	211	390	393	328	328
— ...	97	—	248	245	—	200	359	360	304	306
— ...	107	107	249	247	201	200	367	370	300	299
— ...	102	103	262	255	211	208	384	380	323	323
— ...	114	114	256	—	214	210	380	381	317	316
— ...	—	97	244	242	198	197	358	358	303	305
— ...	112	116	279	274	217	213	393	391	336	331
Oxford ...	98	95	277	280	223	224	410	407	346	346
Dr. A. Thomson	113	112	253	249	214	209	364	364	316	314
Dr. A. Thomson	111	111	270	270	211	210	377	379	335	333
Averages	107·1		260·7		210·0		378·2		320·5	